DISCOVERY

To Cite:
Eniola PO, Adeleke OA, Ologundudu OM, Adekola OA. Attitude of smallholder farmers towards production of fortified Vitamin A Cassava in Oke-Ogun area of Oyo State. *Discovery* 2023; 59: e53d1220

Author Affiliation:
[1]Department of Agricultural Technology, The Oke-Ogun Polytechnic, Saki, Oyo, Nigeria
[2]Department of Agricultural Extension and Rural Development, University of Ibadan, Oyo, Nigeria
[3]Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Ogun, Nigeria

[*]**Corresponding author**
Department of Agricultural Technology, The Oke-Ogun Polytechnic, Saki, Oyo,
Nigeria
Email: eniolaphenol@gmail.com

Peer-Review History
Received: 31 March 2023
Reviewed & Revised: 03/April/2023 to 13/April/2023
Accepted: 17 April 2023
Published: May 2023

Peer-Review Model
External peer-review was done through double-blind method.

Discovery
pISSN 2278–5469; eISSN 2278–5450

Attitude of smallholder farmers towards production of fortified Vitamin A Cassava in Oke-Ogun area of Oyo State

Eniola PO[1*], Adeleke OA[2], Ologundudu OM[2], Adekola OA[3]

ABSTRACT

This study investigates the constraints encountered by smallholder farmers in the production of fortified vitamin A cassava in Oke-Ogun Area of Oyo State. Purposive sampling procedure was used to select 108 respondents from 3 LGAs where Vit. A cassava stem was distributed to farmers from International Institute of Tropical Agriculture (IITA). Interview schedule and structured questionnaire were used for data collection and data were analyzed using descriptive and inferential statistic like chi-square. The study shows that 70% of respondents were male with mean age of 40.34±32.9 years. About 38% had secondary education and majority (74%) got information on Vitamin A fortified cassava through radio. Average farm size was 2 acres mostly acquired through inheritance (52%). Mean years of farming experience was 9.48±6.29 years with average monthly income of ₦22, 299.50±₦16, 241.60. The most utilized source of labour was hired (64%) while most cultivated cassava type were UMUCASS 36/TMS-IBA011368) (64.6%) and UMUCASS 38/TMS-IBA011412 (59.7%) though new varieties (UMUCASS 44, 45 and 46) had been introduced through the State Agricultural Development Programme (ADP) in collaboration with IITA. Respondents' attitude to Vitamin A cassava production was favourable (52.6%). Constraints encountered by respondents in the production of Vitamin A cassava included pest and rodents' infestation (0.84±0.63), land degradation (0.67±0.66), high labour cost (0.69±0.57) and low shelf life of Vit. A cassava (0.86±0.69). Respondents' education level (χ^2=20.69), years of farming experience (χ^2=3.99), farm size (χ^2=2.92) and access to labour (χ^2=2.89) had significant relationship on farmers' production of vitamin A cassava in the study area. Production of Vitamin A cassava is on the decline in the study area due to various challenges encountered by respondents. The study recommends training of farmers on nutritional benefits and value addition of vitamin A cassava for increased income.

Keywords: Vitamin A, Production, Yield, Starch, Attitude, Constraints

1. INTRODUCTION

Of the entire starchy crop available in South-western Nigeria, cassava is one of the mostly accepted by all tribes and communities (Chiaka et al., 2022). This is

because it has ability to survive drought and thrive in all bad soil and could be processed into many food stuffs (Sanni et al., 2009). Throughout the world, Nigeria produces the highest quantity of cassava. Thus, contribute significantly to the gross domestic product of the country with about 21percent share in the world market (FAO, 2013). However, most of this cassava produced are processed into 'gari', 'tapioca', 'fufu', cake, among others with little used as livestock feeds, bread production and in the production of industrial starch and alcohol.

There are different varieties of cassava planted by the farmers in the south western Nigeria such as TME 419, TMS 90257, TMS 91934, TMS 81/00110, TMS 82/00661, TMS 30001, TMS 30555, TMS 30572 and local cultivars-Nwugo, Nwaiwa, Ekpe and Okotorowa. The starch available in each variety influences their usability by the end users. Most of the time, farmers search for the variety that will give more starch and look bulky.

The high deficiency of vitamin A form the existing varieties of cassava made the researchers to develop the one that can release vitamin A to the human body when consumed. Hence the Harvest Plus and International Institute of Tropical Agriculture (IITA) in year 2011 first developed the cassava variety that can produce up to 40% Vitamin A with improved pest and disease-resistance traits and are high yielding. They are UMUCASS 36, UMUCASS 37 and UMUCASS 38 commonly known as IITA-TMS-IBA011368, IITA-TMS-IBA1371 and IITA-TMS-IBA011412 respectively. These new varieties possess greater amounts of beta-carotene (the substance that the body converts to vitamin A and are at least six times more nutritious than the common white-fleshed cassava). However, when it was noticed that the vitamin A in the varieties introduced were still not enough to prevent night blindness and other infectious diseases especially in the children and pregnant women, more varieties were also developed such as the UMUCASS 44, UMUCASS 45 and UMUCASS 46 and are commonly known as NR07/0220, IITA-TMS-IBA070593 and IITA-TMS-IBA070539. These varieties have a pro-vitamin A content that averages 10 parts per million (ppm) based on fresh roots as compared to the first series. These new yellow varieties were bred using indigenous (non-transgenic) methods by IITA and the Nigeria National Root Crops Research Institute (NRCRI) for their high concentrations of β-carotene (FAO, 2013). This variety was introduced to the farmers through 'on-farm adaptive research' using mini kit system and thereafter multiplied and sold to medium scale farmers and also used farmer-to-farmer dissemination method to ensure that small scale farmers get free stem for multiplication (Ilona et al., 2017).

Research indicated that about 30% children of below age of five and 20% of pregnant women are mostly deficient to Vitamin A in Nigeria (Umunakwe et al., 2015). Thus, consuming more of vitamin A deficient cassava may aggravate the problem of blindness. Since cassava is a staple food consumed by people of different ages, it will be good that it is devoid of disease-causing elements. The non-bulkiness of the vitamin A cassava variety tends to scare the farmers from growing it. Farmers always look for cassava with huge root tubers so as to gain high market values since those buying in large quantity always weigh with scales without discriminating between the qualities. Among other factors that affect the quality of output from cassava is the processing method. Those processing locally sometimes leave some residues of elements that are not useful to human health such as hydrocyanide which is very toxic.

Cassava is processed into several meals and consumed more than once daily by the poor people without addition of fruits and protein that can reduce the incidence of diseases. Except there is great awareness on the suitability of Vitamin A cassava, farmers will continue to plant other high yielding variety and consumers will equally continue to consume them. More so, farmers still face a mirage of challenges in the cultivation of Vitamin A cassava due to low value attach to it, its marketing and processing. Despite all these research discoveries about challenges of cassava production, dearth of knowledge still exists on the constraints faced by farmers on the production of Vitamin A fortified cassava in Oyo State. Hence, the need to investigate the constraints associated with the production of fortified vitamin A cassava among smallholders' farmers in Oyo State, Nigeria.

The general objective of this study is to investigate the constraints encountered by smallholder farmers in the production of Vitamin A cassava in rural areas of Oyo State, Nigeria while the specific objectives included to:

Describe respondents' socio-economic characteristics in the study area

Ascertain respondents' source of information on Vitamin A production

Determine respondents' attitude towards Vitamin A cassava production in the study area

2. METHODOLOGY

The study was carried out in selected rural communities of Oyo State, Nigeria. The state is bounded by Republic of Benin, Osun, Kwara and Ogun States and there are 33 local government areas in the state. According to 2006 National population census, the population of the State stood at 5,591,589. The weather conditions vary between the two distinct seasons in Nigeria; the rainy season (April - October) and the dry season (November - March). Oyo is located in the south west of Nigeria and it was among the 3 states

carved out of the former Western State of Nigeria in 1976. The state has 33 local government areas. Oyo State covers a total of 28, 249 square kilometres of land mass and it consists of old hard rocks and dome shaped hills. Oyo State is one of the food baskets in the federation. Agriculture is the major source of income for greater number of people in the State providing food and shelter, employment, industrial raw materials and remains an important source of internally generated revenue in the state. The climate of Oyo State is tropical with distinct wet and dry season with temperature ranging between 22-38^{0}C which favors the growth of food crops (like yam, cassava, millet, maize, fruits, vegetables and plantains), cash crops (such as cocoa, Tobacco and Timber) as well livestock like ruminant, poultry, fish and forest animals. The state has two vegetation zones which are derived savannah and forest zones.

The population of the study consists of cassava growers in the selected local government areas of the State. Data for this study were collected using structured questionnaire and interview schedule. Multi stage sampling procedure was used for the study. Stage 1 involves random selection of 30% of the 17 rural LGAs in the State to give Ibarapa-East, Lagelu and Atisbo LGAs.
Stage 2 involves purposive selection of three communities from each of the selected LGAs where Vitamin A cassava stems had been distributed. From the population of Vitamin A farmers in the selected communities, 20% of farmers were randomly selected. Thus, 52 (260) farmers from Ibarapa-East, 24 (120) farmers from Lagelu and 32 (160) from Atisbo LG as were randomly selected. A total of 108 respondents were considered for the study.

Data for the study was analysed using descriptive and inferential statistics such as frequencies, percentages which were used to measure socio-economic characteristics of cassava farmers, attitude farmers towards Vitamin A cassava production in the study area.

3. RESULTS AND DISCUSSION

Table 1 shows that majority (70.0%) of the farmers sampled were male. It is a general belief that men are more actively productive and efficient in farming practices due to labour intensive nature of cassava production, especially in a developing economy like ours and because farming requires carrying out strenuous work on the farm, other than their female counterparts. Almost all the respondents (97.7%) were married and majority (83.7%) of them were Christians. The study also revealed the mean age of the farmers as 40.34±32.9 years indicating that they were mostly youths and are still in their productive age which may translate to high efficiency of cassava production. The mean household size of 4.26±1.03 indicates that the farmers most likely had access to family support for their agricultural production. More of the farmers (37.5%) had secondary education while 34.9% of them had tertiary education and the remaining 28% had primary and adult education respectively. This result implies that majority of the respondents had one form of education or the other and are probably aware of the benefits of Vitamin A cassava consumption.

Respondents' other income generating activities include trading (50.0%), artisan (38.9%) and agro-processing (11.1%). This implies that majority of the farmers have other source(s) of income apart from cassava production. Average farming experience of respondents' is 11 years with average farm size of 1.94±0.51 acre and monthly income of ₦22, 299.50±₦16, 241.60. This implies that most of the farmers operate on small scale basis. Most utilised source of labour for Vitamin A cassava production was hired (64%) while most cultivated cassava types were UMUCASS 36/TMS-IBA011368) (64.6%), UMUCASS 38/TMS-IBA011412 (59.7%) and UMUCASS 37/TMS-IBA01371 (49.2%) which were the first sets of improved cassava varieties disseminated to farmers. This suggests that farmers in the study area are not yet familiar with the new varieties of fortified Vitamin A cassava recently developed.

Source of information on Vitamin A cassava

Data on Table 2 reveals that majority (74.2%) of the farmers obtained information about improved cassava varieties through radio followed by farmer associations (60.2%). It further reveals that Research Institutes (45.7%), friends and families (40.0%), Extension agents (32.8%) and Television (30.5%) were other significant sources of information on Vitamin A cassava varieties utilised by respondents in the study area. This result confirms the rising importance of farmers' groups in the dissemination of improved agricultural technologies. According to Akinnagbe and Ajayi, (2010) farmers' groups play vital roles in agricultural development in developing countries. The result also highlighted the relevance of radio in technology transfer because of its potentials such as speed and ability to reach a large audience irrespective of location at the same time and because of its relatively low cost and ubiquity in rural areas to disseminate agricultural information in local languages. According to World Bank, (2012) radio and other ICTs like mobile phones have been used in reaching out to farmers.

Table 1 Distribution of the respondents' socio-economic characteristics

Variables	Percentage	Mean	SD
Sex			
Male	83.7		
Female	16.3		
Marital Status			
Single	2.3		
Married	97.7		
Age (in years)			
<30 years	2.3	40.34	32.90
30-39 years	25.6		
40-49 years	44.2		
50-59 years	23.3		
≥ 60 years	4.7		
Religion			
Christianity	83.7		
Islam	16.3		
Household size			
1-2 persons	2.3	4.26	1.03
3-4 persons	60.5		
above 4 persons	37.2		
Education level			
Adult Education	8.3		
Primary Education	18.6		
Secondary Education	38.2		
Tertiary Education	34.9		
Other income generating activities			
Trading	50.0		
Artisan	38.9		
Agro-processing	11.1		
Source of labour			
Family	32.2		
Hired	64.0		
Communal	03.8		
Farming experience			
< 5 years	16.7	9.48	6.29
5-10 years	33.3		
11-16 years	27.8		
17-22 years	11.1		
> 22 years	11.1		
Monthly income			
<20,000	16.7	22299.50	16241.60
20,001-30,000	38.9		
30,001-40,000	38.9		
>40,000	5.6		
Farm size (acres)			
<1	15.2	1.94	0.51
1-2	68.3		

3-4	11.8		
>4	4.7		
Cultivated Vit. A cassava types*			
UMUCASS 36 (TMS-IBA011368)	64.6		
UMUCASS 37 (TMS-IBA01371)	49.2		
UMUCASS 38 (TMS-IBA011412)	59.7		
UMUCASS 44 (NR07/0220)	45.0		
UMUCASS 45 (TMS-IBA070593)	44.7		
UMUCASS 46 (TMS-IBA070539)	35.2		

* Means multiple responses

Table 2 Respondents' source of information on Vitamin A cassava

Source of information on Vit. A cassava*	%	Mean
Radio	74.2	1.56
Farmer Association	60.2	1.42
Television	30.5	0.92
Families and friends	40.0	1.02
Extension agents	32.8	0.98
Research Institutes	45.7	1.15
Publications	14.8	0.23
Internet	5.6	0.13

* Means multiple responses

Attitude of respondents to Vitamin A cassava

Table 3 reveals that respondents strongly disagreed that Vitamin A cassava does not grow on any other type of soil apart from loamy (57.9%) that propagation of Vitamin A cassava is different from other varieties (52.6%) and that Vitamin A cassava is prone to pest and diseases (52.6%). It was also established that many (42.1%) of the farmers did not agree that Vitamin A cassava is more expensive than that of other varieties and that the taste of Vitamin A cassava produce is sour compared to other cassava varieties (36.8%). On the other hand, however, majority (63.2%) of them agreed that customers prefer high starch content cassava varieties. Vitamin A cassava commands high export value, more than half of the respondents (57.9%) strongly agreed that consumption of Vitamin A cassava improves eye sight problem while 52.6% agreed that Vitamin A cassava can help improve the country's economy through its value addition. Few (47.4%) however agreed that Vitamin A production is labour intensive and 47.4% of them strongly agreed that yield of Vitamin A cassava low compared to other varieties.

Table 4 however denotes that 52.6% of the respondents had favourable attitude towards Vitamin A cassava production in the study area. This is due to the fact that many of the respondents had increased yield and income derived as benefits. This is supported by Ogunsumi, (2011) in a similar study that favourable attitude of farmers towards any agricultural practice or innovation is an indication of improved yield and agricultural production.

Table 3 Distribution of respondents' attitude to Vitamin A cassava production

Attitude Statements	SA	A	U	D	SD	Mean
Vit. A cassava production is labour intensive	26.3	47.4	15.8	10.5	0.0	0.94
Vit. A Cassava does not thrive on any other type of soil except loamy	0.0	0.0	10.5	31.6	57.9	0.63
Vit. A cassava does not have a long shelf life	0.0	2.0	19.1	42.1	36.8	0.76
Processing of Vit. A cassava reduces its nutritional value	0.0	0.0	21.1	31.6	47.4	0.74
Yield of Vit. A cassava is low compared to other varieties	47.4	31.6	10.5	5.3	5.3	1.15
Value addition of Vit. A cassava help improve the country's economy	36.8	52.6	10.5	0.0	0.0	0.65
Customers prefer high starch content of cassava varieties	21.1	63.2	10.5	5.3	0.0	0.75
Consumption of Vit. A cassava improves eye sight problem	57.9	31.6	0.0	10.6	0.0	0.84
Propagation of Vit A cassava is different from that of other varieties	0.0	5.3	10.5	31.6	52.6	0.81
Vit. A cassava stem is more expensive than that of other varieties	0.0	5.3	15.8	42.1	36.8	0.88

Taste of Vit. A cassava produce is sour compared to that of other varieties	5.3	21.1	21.1	36.8	15.8	1.16
Vit. A cassava is more consumed by children and pregnant women	31.6	26.3	21.1	15.8	5.3	1.19
Over consumption of Vit. A cassava has no side effect	31.6	10.5	15.8	22.0	20.1	0.97
Vit. A cassava production requires high technicality	31.6	47.4	15.8	5.3	0.0	0.85
Vit. A cassava is prone to pest and diseases	0.0	0.0	10.5	36.8	52.6	0.65
Vit. A cassava can be planted together with other cassava varieties	5.3	15.8	15.8	42.1	21.1	1.17

Table 4 Categorization respondents' attitude towards Vit. A cassava production

Vit A cassava Attitude category	Mean score		Mean	Std Dev.
Unfavourable	<68.0	47.4	68.0	20.4
Favourable	68 and above	52.6		

Constraints to Vitamin A cassava production

Data on Table 5 reveals that constraints encountered by respondents in the production of Vitamin A cassava included pest and rodents' infestation (0.84±0.63), land degradation (0.67±0.68), high labour cost (0.69±0.57) and low shelf life of Vit. A cassava (0.86±0.69). Other constraints encountered by farmers included inadequate credit facility (1.65±1.39), inadequate information on availability and use (2.56±1.67), high technical involvement (1.23±1.02), poor government support (1.11±1.43), low extension coverage (0.94±1.36), inadequate storage facilities (1.17±1.22) and inadequate processing facilities (0.81±0.19). This result is in line with Umunakwe et al., (2015) that inadequate credit facility and information, land tenure system and poor government support are major constraints to production of improved cassava varieties in Nigeria.

Table 5 Constraints to Vitamin A cassava

Constraints	Mean	SD
Pests and rodents' infestation	0.84	0.63
Land degradation	0.67	0.66
High labor cost	0.69	0.57
Inadequate credit facility	1.65	1.39
Low shelf life of Vit. A cassava	0.86	0.69
Poor government support	1.11	1.43
Low extension coverage	0.94	1.36
Inadequate market information	2.56	1.67
High technical involvement	1.23	1.02
Inadequate storage facility	1.17	1.22
Inadequate processing facility	0.81	0.19

Influence of Socio-economic characteristic on Vitamin A cassava production

Data from table 6 reveals that respondents' education level (χ^2=20.69), years of farming experience (χ^2=3.99), farm size (χ^2=2.92) and access to labour (χ^2=2.89) had significant relationship on farmers' production of vitamin A cassava in the study area. This finding agrees with Kuye, (2015) and Ofuoku et al., (2006) that the farmer's level of education, farm size and years of experience can influence agricultural innovation utilization for improved agricultural production. Education is of paramount importance in rational decision taking, it can indirectly determine the decision of household heads as regards production, consumption and savings. The distribution of respondents by level of education revealed that most of the respondents had some form of formal education.

Table 6 Chi square analysis of respondents' socio-economic analysis with constraints to Vit. A cassava production

Variable	χ^2	Df	P
Sex	3.924	1	0.048
Marital status	5.998	1	0.014
Religion	5.062	2	0.080
Education	20.693*	3	0.000
Age	-0.227	1	0.071
Years of experience	3.992*	2	0.015
Farm size	2.921*	2	0.019
Access to labour	2.890*	1	0.042

4. CONCLUSION AND RECOMMENDATIONS

The need to improve the nutritional content of cassava as an important staple crop consumed by most Nigerians is a welcome development by producers and consumers. Farmers mostly got informed about the improved varieties of cassava through radio with a favourable attitude towards its production in the study area. The new varieties of Vitamin A cassava included NR07/0220, IITA-TMS-IBA070593 and IITA-TMS-IBA070539. However, despite the positive awareness to production of Vit. A fortified cassava and income for producers of the staple crop, there are some challenges farmers encounter in the production of improved cassava varieties which included pests and rodents' infestation, land degradation, high labour cost and inadequate storage facilities. Also, bad opinion of farmers on the yield and starch content of Vitamin A cassava in the study area. Based on the findings of the study, it is therefore recommended that: Different prices of the cassava products should be established depending on the varieties. This will encourage the producers of Vit. A cassava to further adopt its production. Rural farmers should be encouraged to belong to farmers' groups such as cooperatives so as to increase their access to extension services. This will also enable them enjoy other benefits accruable from such groups such as starting up savings, obtaining loans / credits and getting agricultural services at reduced prices. There should be regular training of farmers on nutritional benefits and value addition of vitamin A cassava through their farmer groups to further sustain their attitude and for increased income. The efficiency of the extension service should be enhanced. This can be achieved through the recruitment of more extension staff, especially field staff and organization of routine training for all cadres of extension staff. There is also the need to introduce innovative extension delivery methods (such as the use of ICTs) so as to enhance the timely dissemination of agricultural innovations. This would promote extension coverage.

Author Contribution

Introduction was written by Adeleke OA; Methodology was written by Eniola PO; Data were analysed by Ologundudu OM and discussion was written by Adekola OA.

Declaration of consent

We wish to state that this article has not been published by any journal.

Informed consent

Not applicable.

Ethical approval

Not applicable.

Conflicts of interests

The authors declare that there are no conflicts of interests.

Funding

The study has not received any external funding.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Akinnagbe OM, Ajayi AR. Challenges of farmer-led extension approaches in Nigeria. World J Agric Sci 2010; 6(4):353-359.
2. Chiaka JC, Zhen L, Xiao Y. Changing Food Consumption Patterns and Land Requirements for Food in the Six Geopolitical Zones in Nigeria. Foods 2022; 11:150. doi: 10.339 0/foods11020150
3. FAO. Food Agricultural Organization. International trade in cassava products: African perspective 2013; 12.
4. Ilona P, Bouis HE, Palenberg M, Moursi M, Oparinde A. Vitamin A Cassava in Nigeria: Crop Development and Delivery. Afr J Food Agric Nutr Dev 2017; 17(2):12000-12025. doi: 10.18697/ajfand.78. HarvestPlus09
5. Kuye OO. Comparative Analysis of Constraints to Cassava Production by Cassava Farmer Loan Beneficiaries and Loan Non-Beneficiaries in South-South Nigeria. Glob J Agric Res 2015; 3(3):38-52.
6. Ofuoku AU, Uzokwe UN, Ideh V. Comparative Analysis of Co-operative and Non-Cooperative Fish Farmers in Central Agro-ecological Zone of Delta State, Nigeria. Ext Farming Syst J 2006; 2(1):97-104.
7. Ogunsumi LO. Attitude of farmers towards improved agricultural technology in South west Nigeria. Afr J Biotechnol 2011; 10(50):10108-10115.
8. Sanni MO, Sobamiwa AO, Rosling H, Eyinla CM. The importance of cassava as sustenance for Ibadan small-scale garriprocesors. In: Akorada MO, Ekanayake IJ editors. Root crops and poverty alleviation. Proceedings of the 6th triennial symposium of the International Society for Tropical Root Crops – Africa Branch (ISTRC-AB), Lilongwe, Malawi 2009; 2 90-292.
9. Umunakwe PC, Nwakwasi RN, Ani AO, Ejiogu-Okereke EN, Nnadi FN. Constraints to the Adoption of Improved Cassava Varieties among Rural Farmers in Imo State, Nigeria. Asian J Agric Ext Economics Sociol 2015; 6(1):56-63.
10. World Bank. ICT in agriculture resource book: Using ICT to enable agricultural innovation systems for small holders. Forum 4. World Bank, Washington DC, USA 2012.